[0013] As discussed previously, in one embodiment, low pressure unit **12** (FIG. **1**) is coupled to fan shaft **34** via epicyclic gear system **36**. Sun gear **42** is attached to and rotates with low pressure shaft **18** (FIG. **1**). Sun gear **42** is rotatably mounted on low pressure shaft **18**. Carrier **48** is stationarily mounted within gas turbine engine **10** (FIG. **1**) to the non-rotating engine case walls radially outboard of gear system **36**. Carrier **48** has two generally interfacing faces which support the ends of the stationary journal bearing **44**. Ring gear **40** is connected to fan shaft **34** (FIG. **1**) which turns at the same speed as fan **32** (FIG. **1**). Star gear **38** (only one is illustrated although epicyclic gear system **36** includes a set of multiple star gears) is enmeshed between sun gear **42** and ring gear **40** such that star gear **38** rotates when sun gear **42** rotates. Star gear **38** is rotatably mounted on the stationary carrier **48** by journal bearing **44**. When low pressure unit **12** rotates, epicyclic gear system **36** causes fan shaft **34** to rotate at a slower rotational velocity than that of low pressure unit **12**. The operation of similar epicyclic gear systems and lubrication systems for epicycle gear systems are further detailed in U.S. Pat. Nos. 6,223,616 and 5,102,379, which are herein incorporated by reference.

[0014] In the embodiment shown in FIG. **2**, stator journal bearing **44** is positioned inside of rotatable star gear **38**. Lubricant manifold **46** is disposed adjacent to journal bearing **44** and is fluidly connected thereto. Star gear **38** is rotatably mounted on carrier **48** by bearings. More specifically, star gear **38** is rotatably mounted on carrier **48** by journal bearing **44**. End caps **50** are welded or otherwise affixed to journal bearing **44** and press fit into carrier **48**. End caps **50** and carrier **48** provide support for journal bearing **44**. Fasteners extend through end caps **50** and connect to carrier **48** to act as an anti-rotation feature to keep journal bearing **44** stationary.

[0015] Axial passage **54** is fluidly connected to lubricant manifold **46**. Lubricant manifold **46** is fed pressurized lubricant from other components of the gas turbine engine via feed tube **62**. Liquid lubricant from lubricant manifold **46** is supplied through axial passage **54** to radial passages **56**. After leaving cavity **56**, the lubricant flows through radial passages **56** into distribution recess **58** between journal bearing **44** and star gear **38**. Distribution recess **58** extends along the exterior surface of journal bearing **44**. The lubricating liquid forms a film of lubrication on journal bearing **44** in the distribution recess **58**. From distribution recess **58** the film of lubrication spreads circumferentially and axially due to viscous forces between star gear **38** and journal bearing **44**. The lubricant film helps to support star gear **38** and reduce friction between inner surface **60** of star gear **38** and interface surface **52** of journal bearing **44** as star gear **38** rotates. To ensure adequate thickness of the lubricant film, the rate the lubricant is fed to interface surface **52** of the journal bearing **44** varies and is determined by the pressure profile and temperature at the interface between star gears **38** and journal bearings **44**. In one embodiment, the flow rate of the lubricant provides interface surface **52** of journal bearing **44** with a minimum lubricant film thickness of between about 0.00254 mm (100 micro inches) and 0.0508 mm (2000 micro inches).

[0016] As shown in FIG. **2**, journal bearing **44** extends radially outward from an axis of symmetry that generally aligns with axial passage **54** to outermost interface surface **52**. Star gear **38** has inner surface **60** that extends parallel to and fronts interface surface **52** of journal bearing **44**. More particularly, inner surface **60** runs against interface surface **52** as star gear **38** rotates. Lubricant film (discussed previously) spreads circumferentially and axially in a boundary regime between interface surface **52** and inner surface **60** from distribution recess **58** due to viscous forces between star gear **38** and journal bearing **44**.

[0017] The main body portions of star gear **38** and journal bearing **44** are typically made of steel. Commonly used steels include AMS 6265 and AMS 6308. In one embodiment, inner surface **60** is formed by a "soft" metal coating or liner, solid film coating material, or another bearing material which covers the inner portion of star gear **38**. One such "soft" metal coating or liner can be comprised of a copper/lead alloy with a composition (by weight) of about 72 percent copper and 28 percent lead. The metal is "soft" in relation to the metal inner surface **60** is paired with and wears on (and against) journal bearing **44**. In one embodiment, interface surface **52** of journal bearing **44** is comprised of AMS 6308 case-hardened by carburization and smoothed by a super-finishing manufacturing process, discussed subsequently. Together the composition of interface surface **52** (harder metal) and inner surface **60** (more soft metal) comprise a tribological pair. During operation inner surface **60** is worn by interface surface **52** (harder metal) such that inner surface **60** conforms to interface surface **52** to control friction therebetween. Interface surface **52** is super-finished to remove larger asperities and achieve an amorphous surface roughness of less than 5 micro inches (127 micro mm) measured on an R_a scale. Super-finishing is a manufacturing technique involving the refinement of a surface of a part using mechanical and in some instances chemical processes. An amorphous surface is one that has no directional surface pattern left to it. Thus, with an amorphous surface, surface asperities are removed or substantially reduced in a random pattern rather than being laid in a particular direction as associated with honing or grinding. Thus, surface roughness of inner surface **60** also becomes relatively smooth due to operational wear of the tribological pair. This reduces friction between journal bearing **44** and star gear **38**, allowing for increased moment capability of epicyclic gear system **36** and reducing bearing/lubricant temperatures in the boundary regime condition between inner surface **60** and interface surface **52**. In other embodiments, the liner, coating, film or other soft bearing material can be disposed on journal bearing **44** to form interface surface **52** rather than inner surface **60**, and inner surface **60** can be steel case-hardened by carburization and smoothed by super-finishing manufacturing process.

[0018] In one embodiment, interface surface **52** is super-finished in various manners such as are described in U.S. Pat. Nos. 4,491,500, 4,818,333, 5,503,481, and 7,005,080 and United States Patent Application Publication No. 2002/0106978, which are herein incorporated by reference. More particularly, reactive chemicals in solution are added to a mass finishing device (for example a vibratory bowl or tumbling barrel) in combination with metallic, ceramic or plastic bodies (called "media") and one or more journal bearings **44**. The chemicals include phosphoric acid or phosphates, sulfamic acid, oxalic acid or oxalates, sulfuric acid or sulfates, chromic acid or chromates, bicarbonate, fatty acids or fatty acid salts, or mixtures of these materials. The solution may also contain an activator or accelerator, such as zinc, magnesium, iron phosphates and the like, as well as inorganic or organic oxidizers, such as peroxides, meta-nitrobenzene, chlorate, chlorite, persulfates, nitrate, and nitrite compounds. A variety of chemical solutions useful to the super-finishing process are sold commercially by REM Chemicals, Inc of